TR Series

5-Phase High Torque Stepping Motor Driver User's Manual

Made by TROY Enterprise Co., Ltd

TÜV Rheinland / Berlin-Brandenburg TÜV Anlagentechnik GmbH ISO14001 Certificate No.: 09 104 9351

TÜV CERT DIN EN ISO 9001:2000 Certificate: 09 100 99275

Environment Responsibility

- TROY is always committed to environment protection. All packaging material is recyclable and reusable
- If disposing of used product, please recycle by type as per waste disposal procedures.

----------Protect the green earth with your care and commitment--------

※The product is subject to design modification for performance improvement without prior notice. For more details please contact your local seller.

Precautions

Precautions for using

1.Thank you for purchasing TROY products. Please read this user's manual thoroughly before installing and operating the driver, and always keep the manual where it is readily available.

2. The products described in this manual has been designed and manufactured for use in industrial machinery, and must not be used for any other purpose. We are not responsible for any damage caused through failure to observe this warning.

3.Check that the motor, driver and any accessories are all present. If an accessory is missing or damaged, contact the nearest our branches.

4.Never disassemble the motor and driver. Damage or performance impairment may result. Disassembly voids all warranties.

Precautions for maintenance

Check the ambient environments, clean the system equipment to remove dust and tighten the screws periodically. Also pay attention to the followings.

1. Contact us when repairs become necessary.
2. Since the temperature of the frame of the driver can rise high, be careful when conducting maintenance work or inspection work.

Precautions for warranty period

Within the period of one year after delivery of the system equipment, when failures occurring from design error or fabrication error attributable to the manufacture side occur, we will be repairing the failure free of charge within the reparable range or will replace with substitute.
(We cannot hold ourselves responsible for breakage and accidents occurring from your use beyond the specified range described in this document.)

Precautions for disposal

When disposing of the driver and the motor, treat them as ordinary industrial waste.

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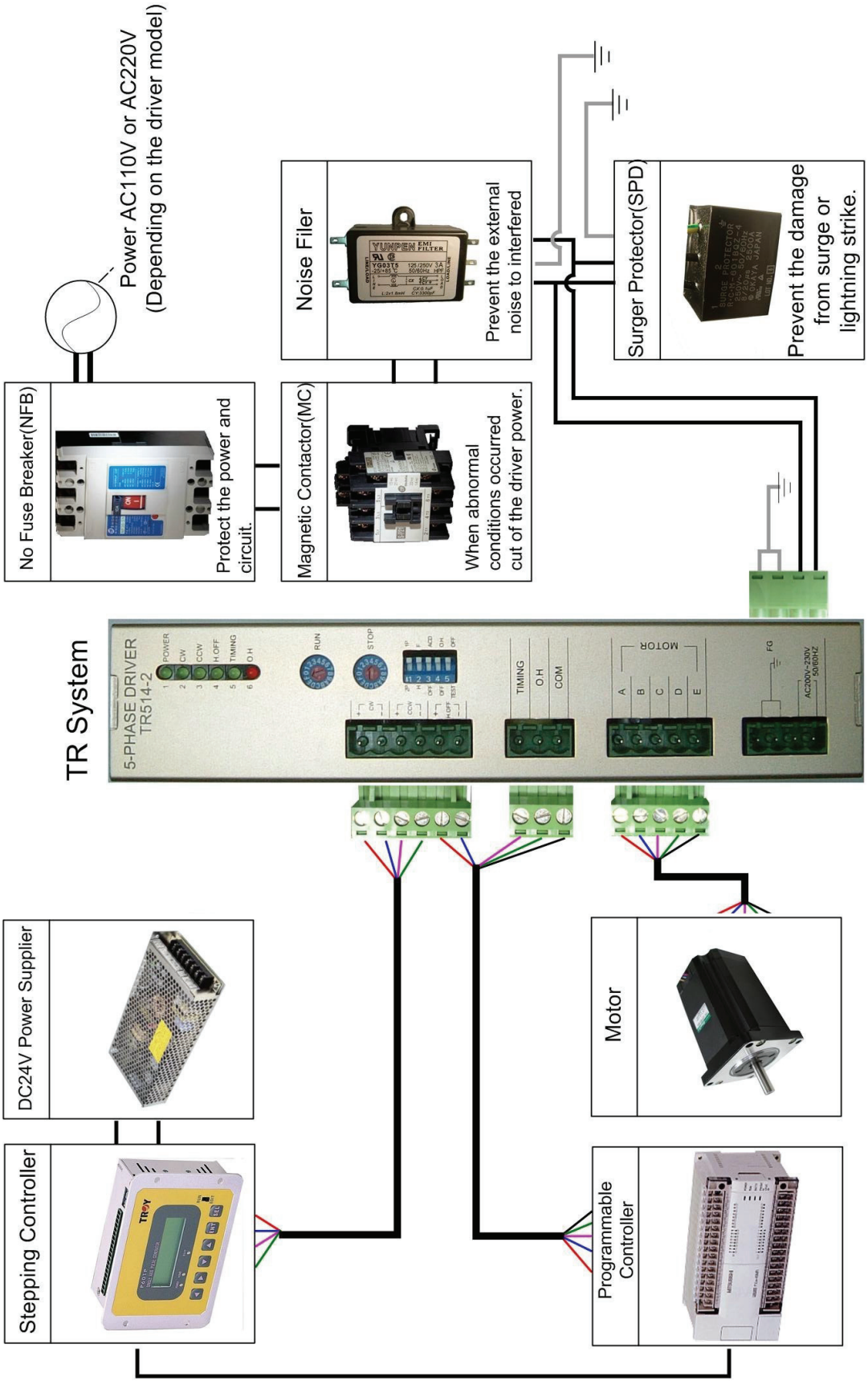
※For any operational or technical question with the product, please contact us for professional service「**0800-450-168**」during our business hours.

1. System Configuration

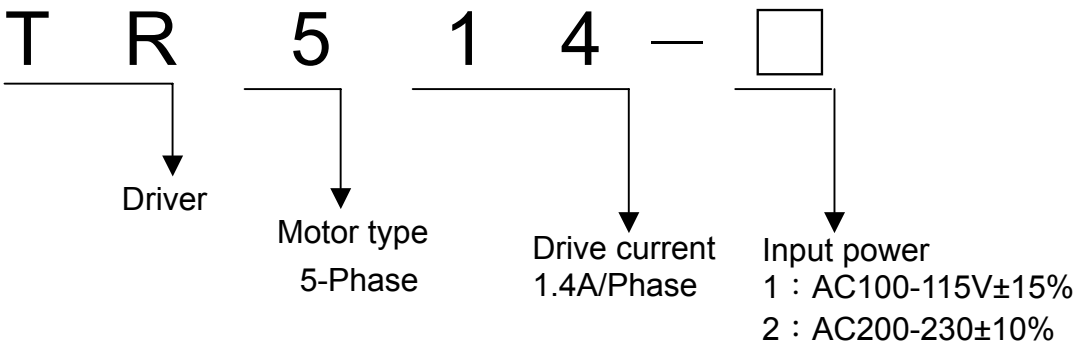


2.Specifications

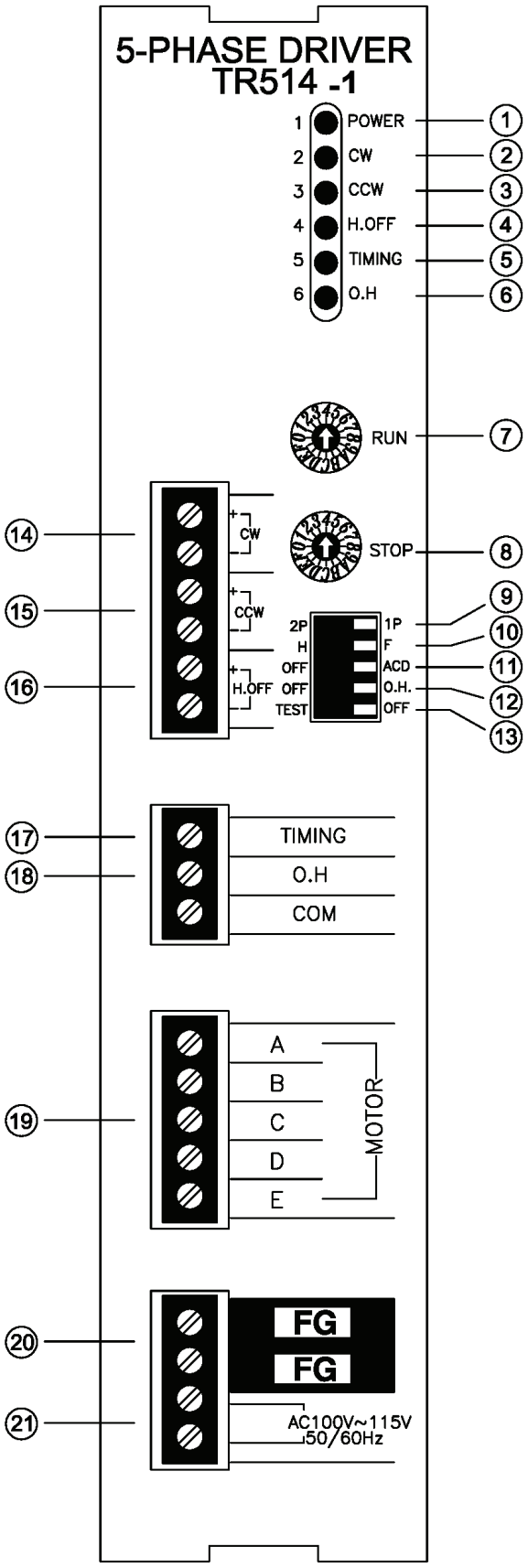
●Specifications

Model		TR514-1	TR514-2
Input power		AC100-115V±15% 5A 50Hz/60Hz	AC200-230V±10% 3A 50Hz/60Hz
Drive current		1.4A/Phase	
Excitation mode		Full step：0.72° 4-Phase Excitation Half step：0.36° 4-5-Phase Excitation (Convertible)	
Signal input/output		●Photo coupler input interface ●Transistor open collector output interface	
Input signal	CW Pulse input	2 pulse：Clockwise input. 1 pulse：Pulse input	
	CCW Pulse input	2 pulse：Counterclockwise input. 1 pulse：Rotation direction input	
	H.OFF input	Holding OFF input	
Output signal	TIMING output	Excitation phase origin output Full step：10 signals output every 10 pulses Half step：20 signals output every 20 pulses	
	O.HEAT output	The signal is output when the internal heat sink temperature exceeds above 80℃	
Functions		●Step angle switch (F/H) ●Automatic current off when overheat ●Pulse input mode switch (1P/2P) ●Automatic current cutback(ACD) ●Self test (TEST)	
Protect function		Overheat protection：The signal is output when the internal temperature of the driver rises above 80℃,motor stop running	
Display (LED)		POWER, CW, CCW, H.OFF, TIMING, O.H.	
Dimension		115(L)×42(W)×200(H) mm	
Weight		939g	958g
Ambient temperature		0℃~40℃	

●Product number code：



3.Names of driver part



① Power indicator

② CW pulse input indicator

③ CCW pulse input indicator

④ Output current off indicator

⑤ Excitation timing output indicator

⑥ Overheat protection indicator

⑦ Potentiometer for adjusting

⑧ Potentiometer for adjusting current at motor stop

⑨ Switching pulse input system

⑩ Step angle switch

⑪ Automatic current cutback switch

⑫ Overheat protection switch

⑬ Self-inspection switch

⑭ CW pulse signal input terminal

⑮ CCW pulse signal input terminal

⑯ Output current off signal input terminal

⑰ Excitation timing signal output terminal

⑱ Overheat protection signal output terminal

⑲ Motor wiring terminal

⑳ Power grounding terminal

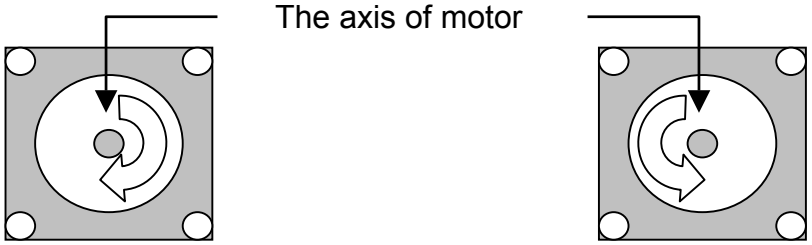
㉑ Power wiring terminal

Code	Name of the panel	Type	Name of function		Function	Remarks
1	POWER	LED	Power indicator		LED lamp turns on upon power input	
2	CW	LED	CW pulse input indicator		When motor rotated clockwise the LED lit up	
3	CCW	LED	CCW pulse input indicator		When motor rotated counterclockwise the LED lit up	
4	H.OFF	LED	Holding OFF indicator		When motor Holding OFF input the LED lit up	
5	TIMING	LED	Excitation phase origin output indicator		Full step：LED lamp turns on every 10 pulses Half step：LED lamp turns on every 20 pulses LED lamp continuously on during high speed operation.	
6	O.H.	LED	Overheat protection indicator		Signal is output when the heat sink temperature of the driver rises above 80℃	
7	RUN	SW	Motor run current potentiometer		Adjust the motor running current	Default：''A''
8	STOP	SW	Motor stop current potentiometer		Adjust the rate of motor current down at standstill	Default：''6''
9	1P/2P	SW	Pulse input	1P side	1-pulse input	Default：''2P''
				2P side	2-pulse input	
10	H/F	SW	Step angle switch	F side	Full step operation,0.72°/step, every 500 pulses turn around	Default：''H''
				H side	Half step operation,0.36°/step, every 1000 pulses turn around	
11	OFF/ACD	SW	Auto current cutback	OFF side	After stop inputting pulse, the current keeps at the value of motor running	Default ''ACD'' ＊ACD recommended to mitigate temp rise of motor/driver
				ACD side	After stop inputting pulse almost 2secs, the current	
12	OFF/O.H.	SW	Overheat protection switch	OFF side	Overheat protection is no function	Default：''O.H''
				ACD side	Overheat protection functioned	
13	TEST/OFF	SW	Self inspection switch	TEST side	The driver rotates CW at the speed of 3pps	
				OFF side	Stop self inspection immediately, please set it on OFF side while operation normally	
14	CW	I	2 pulse：CW pulse signal input		Input clockwise pulse signal via this terminal	L：0~0.5V H：4~5V Input impedance：200Ω Input current：Below 20mA
			1 pulse：Rotation direction control		Input pulse signal via this terminal	
15	CCW	I	2 pulse：Input CCW pulse signal		Input counterclockwise pulse signal via this terminal	
			1 pulse：Rotation direction control		''L'' level clockwise rotation ''H'' level counterclockwise rotation	
16	H.OFF	I	Holding off		Input potential (L) holding off, it makes motor no excitation, and the axis can be rotated freely by hand	
17	TIMING	O	Excitation timing output signal		When full step, signal output every 10 pulses When half step, signal output every 20 pulses	BelowDC24V Below 10mA

18	O.H.	O	Overheat protection signal output terminal	Signal is output when the heat sink temperature of the driver rises above 80℃,at the same time the current output to motor is lower to 0,motor at standstill	
19	MOTOR	O	Motor wiring	It's use to connect the motor to driver	
20	F.G.	I	Machine case ground terminal	Please do the shortest distance connect with system ground wire directly, or connect to the machine case directly	
21	TR514-1 AC100-115V	I	Power input terminal	Connect power voltage AC100-115V±15% 5A 50Hz/60Hz	
	TR514-2 AC200-230V			Connection power voltage AC200-230V±10% 3A 50Hz/60Hz	

※Type description：LED→LED lamp、SW→Switch、VR→Adjustable resistor、I→Input、O→Output

The front view of motor



CW
(Clockwise)

CCW
(Counterclockwise)

4.Current adjustment switch operating methods

(1) Adjusting the motor running current

a. Adjusts the motor current with 「RUN」potentiometer. The adjusting range is 0.45A/phase~ 1.4A/phase

b. The current is defaulted at scale 「A」, the current is 1.07A/phase, approximately current 75%

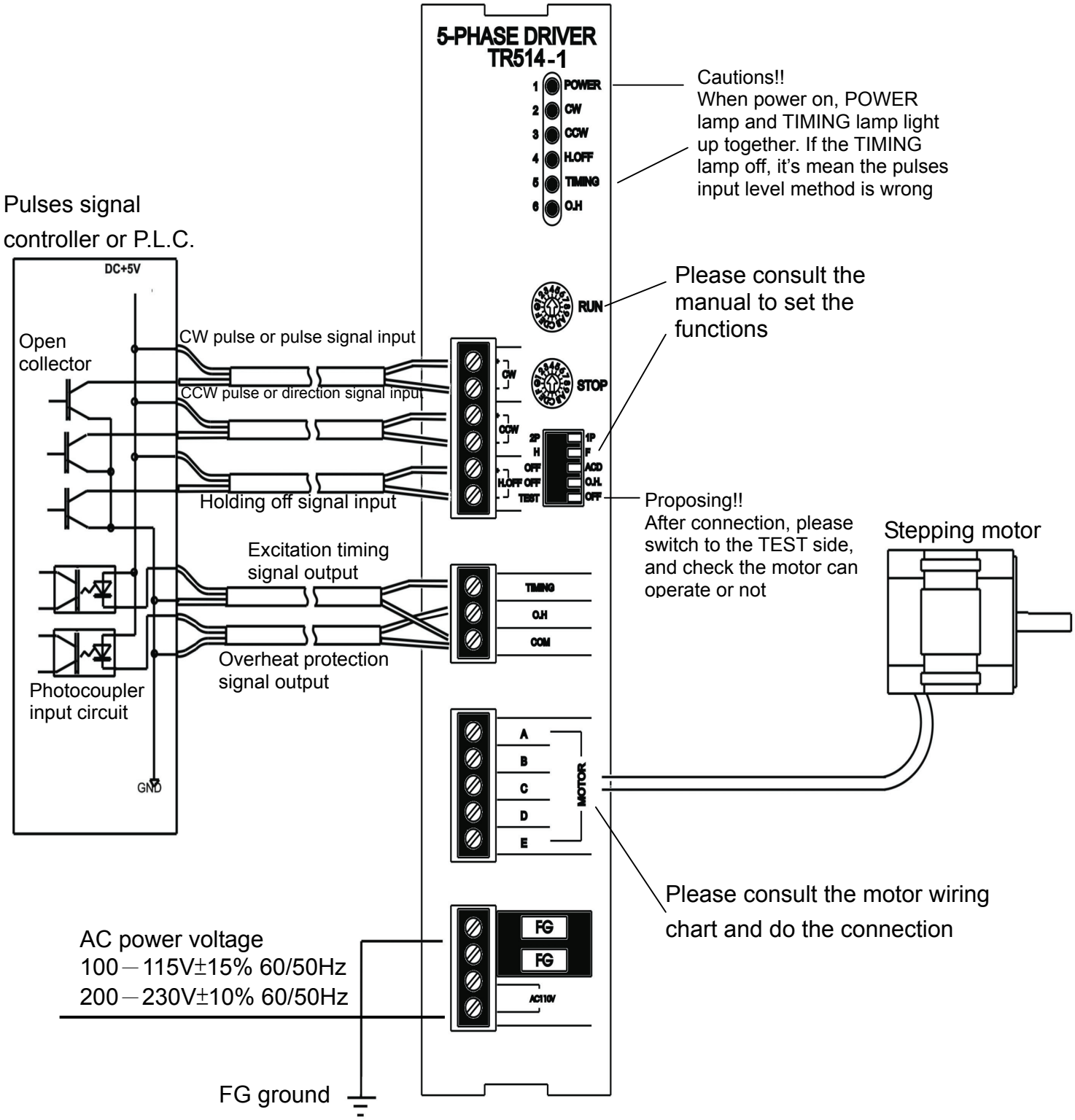
(2) Adjusting the current at motor standstill

a. Using the 「STOP」potentiometer to adjust the current during the motor at standstill. The adjusting range is 23%~100%

b. The current is defaulted at scale「6」. Rate of current drop is 54% (Regard setting current value of 「RUN」as the standard)

Scale	Run current (A/phase)	Drop rate of current (%)
	TR514-1/TR514-2	TR514-1/TR514-2
0	0.45	23
1	0.47	29
2	0.54	34
3	0.60	39
4	0.66	44
5	0.73	49
6	0.79	54
7	0.85	59
8	0.93	65
9	1.00	70
A	1.07	75
B	1.14	80
C	1.20	85
D	1.27	90
E	1.34	95
F	1.40	100

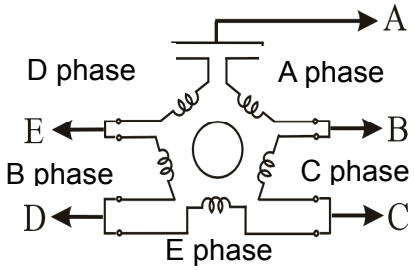
5. Connecting diagrams



Notes：

1. Signal lines should be kept at least 10cm away from power lines (power lines and motor lines).Do not bind the signal line and power line together. If noise generated by the motor lead wire causes problem, try shielding of motor lead wires with conductive tape or wire mesh.
2. If there need to make a long distance between controller and driver or there have other big power device around and operation at same time, it is suggest to raise up input/output DC power voltage (The original setting value＋5V,proposing to raise up to＋12V or＋24V, at this moment it 's need to plus limit current protect resistance R additionally. Please consult P.7) so that can raise up while the signal far distance transmission drive current and strengthen the ability to resist disturbance, make sure motor operation normally
3. Please confirm the definition of ＋COM、－COM contacts before connect with PLC, how to connect with DC＋5V and GND contacts in the diagrams. Please provide the correct input/output power voltage of circuit
4. Adopt easy plug and pull out terminal that are accord with the certification of CE/VDE confirmation, while connecting please locking the screws to avoid bad contact and cause to wrong action

5-phase motor internal connecting diagrams



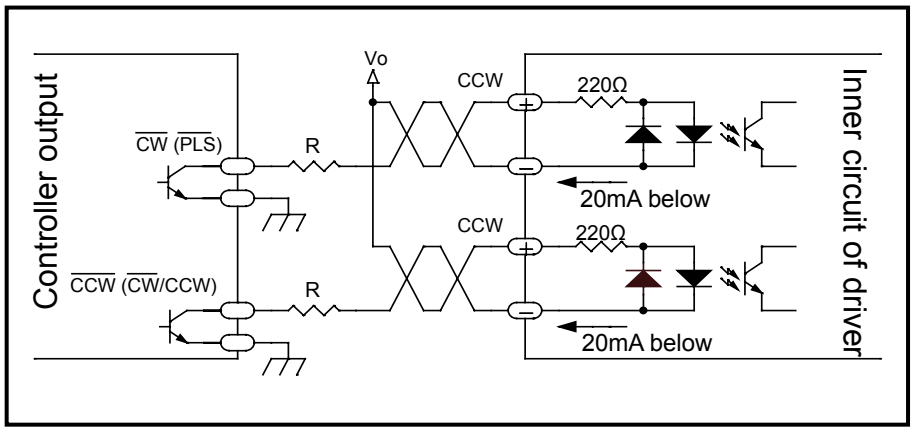
Motor wiring chart

	TROY		SANYODENKI			TAMAGAWA		ORIENTAL	
PIN NO	5 lines	10 lines	5 lines	＊5 lines	10 lines	5 lines	10lines	5 lines	10 lines
A	Blue	Blue/Black	Black	Blue	Black Yellow	Blue	Blue/Black	Blue	Blue/Black
B	Red	Red/Brown	Orange	Red	Black White Orange	Red	Red/Brown	Red	Red/Brown
C	Orange	Purple/Orange	Blue	Orange	Orange White Blue	Orange	Purple/Orange	Orange	Purple/Orange
D	Green	Yellow/Green	Red	Green	Red White White	Green	Yellow/Green	Green	Yellow/Green
E	Black	White/Gray	Yellow	Black	Yellow White Red	Black	White/Gray	Black	White/Gray

※The mark『＊』means new color of Sanyo 5 phase stepping driver of wiring, please refer to this wiring chart.

6.Example of connecting diagrams and operating methods

(1)CW、CCW pulse input



★Note：

Outer voltage of power VO	The external resistance R
5V	—
12V	390Ω 1/4W
24V	1KΩ 1/2W
36V	1.8KΩ 1W

a. 2 pulse input mode

The negative edge-triggered input is employed. The motor stays at ''H'' level in the case of no pulse signal output. The motor turns 1 step clockwise in the case of 1 pulse input at CW terminal. The motor turns 1step counterclockwise in the case of 1 pulse input at CCW terminal.

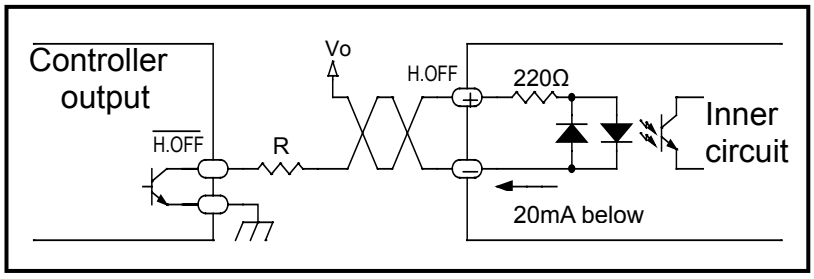
b. 1 pulse input mode

The negative edge-triggered input is employed. The motor stays at ''H'' level in the case of no pulse signal input. The pulse signal goes to CW terminal, while the running direction signal goes to CCW terminal. The motor turns clockwise at ''L'' level and counterclockwise at ''H'' level.

c. Pulse voltage range： 4~5V for ''H'' level, 0~0.5V for ''L'' level.

d. Pulse width $>5\mu$sec minimum, up/down time $<2\mu$sec maximum

(2) H.OFF input

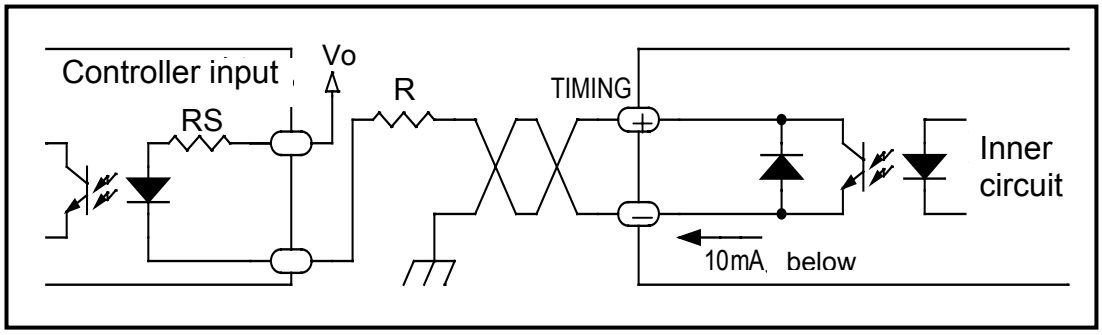


The motor current turns off when the control signal ''H.OFF'' is set to ''L'' level then the motor is HOLD OFF.

★Note：

Outer voltage of power VO	The external resistance R
5V	—
12V	390Ω 1/4W
24V	1KΩ 1/2W
36V	1.8KΩ 1W

(3) TIMING output、O.H. output



★Note：
Please add proper external resistor(R) to keep the current of circuit under 10mA

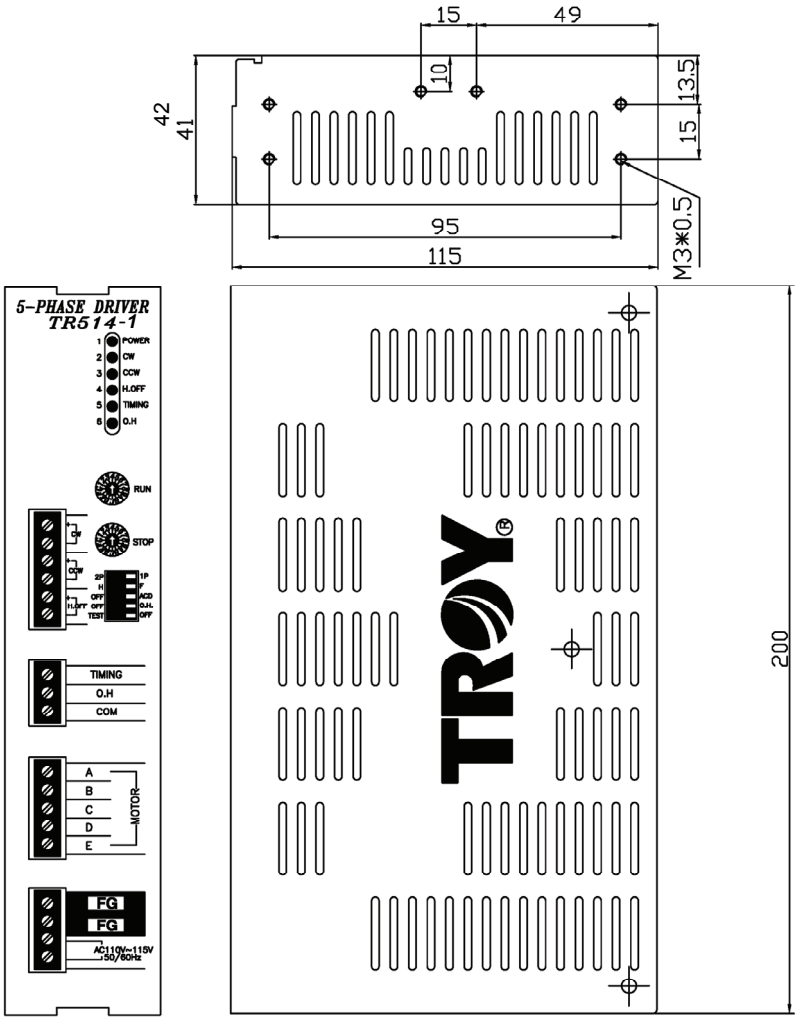
$$R = \frac{Vo}{10mA} - RS$$

※TIMING signal：This timing signal indicates that the excitation state of conforms to the initial detect home position with greater precision by setting the mechanical home position of equipment to coincide with the excitation home position (step0) of the motor. When full step(0.72°/step), the TIMING lamp turns on once every 10 pulses; when half step(0.36°/step), the TIMING lamp turns on once every 20 pulses and send TIMING signal out at the same time. The TIMING lamp is continuously on during high-speed operation and transistor is on.

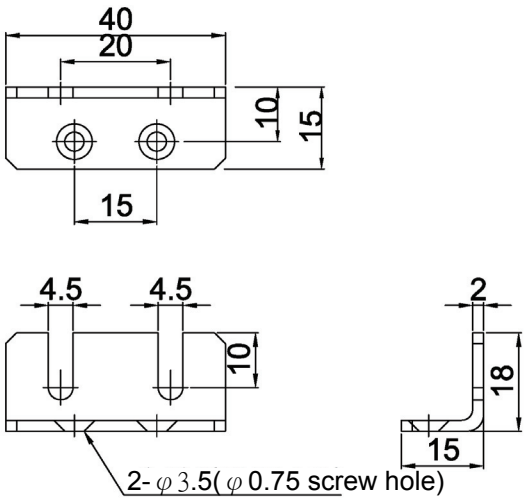
※O.H. signal：Overheat signal output when the internal heat sink temperature of the driver rises above 80℃, the overheat (O.H.) lamp on the front panel lit up when the signal is output. At the same time overheat protection turns on, the current of driver output to the motor will decrease to the 0, and motor stop running

Notes：If this unusual condition happen continued, please check ambient condition, such as operation cycle、frequency、ambient temperature; proposing to make cooling to the driver strictly. If you want to release this unusual condition, it can turn OFF the power more than10 sec, then turn the power ON, or switch the OFF/O.H. of panel to the OFF side, release O.H. signal output, O.H. lamp off, after the driver temperature lower down, please switch it back to the O.H. side

7. Diagrams and mounting



Driver dimension



Mounting bracket dimension

※For environment protection, paper saving and resources preservation, please download the user's manual directly from SUNHOLY website：http://www.sunholy.com.tw

Our constant aim：Demand for professionalism

Our belief ：Commitment to every detail

Our innovation ：Introduction of cutting-edge equipments

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Ready for your request！

SUNHOLY TRDING CO.,LTD

Professional agency

3F,No78.,Sec2,Chang An E.RD. Taipei, Taiwan.
TEL：+886-2-2516-6060
FAX：+886-2-2508-0323

http://www.sunholy.com.tw
E-mail:sales@sunholy.com.tw